MULTIMEDIA UNIVERSITY

STUDENT ID

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

TIS1101 – Database Fundamentals / TDB2111 Database Systems

(All sections / Groups)

15 OCTOBER 2015
9.00 a.m - 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 5 pages, including the cover page, with FOUR questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided.

Answer ALL Questions

QUESTION 1

You are required to design the database for a University, called U1Mas based on the following business rules.

- Every professor teaches exactly one course (no more, no less), and every course must be taught by a professor.
- Each project is managed by one professor (known as the project's principal investigator.
- Each project is worked on by one or more professors (known as the project's co-investigators.
- Professors may manage and/or work on multiple projects.
- Each project is worked on by one or more graduate students (known as the project's research assistants).
- Professor works in a department and a department has many professors.

(a) List any TWO entities for U1Mas besides Professor and Department entities.

[1 mark]

(b) Identify the relationship strength between Professor and Department. Justify your answer.

[2 marks]

(c) Based on the given scenario and your answers in Question 1(a), draw an ER diagram (conceptual model) based on Crow's Foot model to represent the data requirements for U1Mas. Your ER diagram must include the cardinalities, connectivities and participation. You do not need to include the attributes in your ER diagram.

[7 marks]

Continued...

QUESTION 2

The following is a database consisting of SIX relations. The primary keys of the relations are underlined and the dashed lines indicate the foreign keys.

```
Staff (StaffID, StaffName, StaffTel, StaffSalary, SkillID)
Skill (SkillID, SkillDescription)
Event (EventID, EventDate, EventLocation, MenuID)
EventPlanner (StaffID, EventID, Position)
Menu (MenuID, MenuDescription, MenuPrice)
Dish (DishID, DishName, DishSize, MenuID)
```

Answer questions (a) to (e) based on the relations above.

(a) Assume that `Staff` and `Event` tables have been created. Write the Data Definition Language (DDL) script to create the `EventPlanner` table.

[2 marks]

(b) Write a SQL statement to list the most expensive price in the menu.

[1 mark]

(c) Write a SQL statement to list the dish information, which belongs to menu 'Starter of the day'.

[2 marks]

(d) Write a SQL statement to list the location and count the number of event held for each location for the month June 2015.

[2 marks]

(e) Write a SQL statement to list the staff involved (StaffName, StaffTel) in Event ID 112233. Also, include the information on the dishes (DishName, DishSize) that are served for the same event.

[3 marks]

Continued...

QUESTION 3

The following figure shows a patient medication form:

XYZ Hospital, Kuala Lumpur

Patient ID: P1234
Patient Name: John Wilson

Patient is admitted to the following ward:
Ward ID: W10
Ward Name: Surgery Unit

Drug ID	Drug Name	Drug Type	Dosage (mg/ml)	Units per Day
D9596	Tetracyclene	Antibiotic	1	10
D7542	Morphine	Pain Killer	5	20
D7542	Morphine	Pain Killer	5	10
D9596	Tetracyclene	Antibiotic	1	5
D1123	Lexapro	Antidepressant	10	1
D0018	Acetaminophen	Pain Killer	5	2
D1035	Cephalexin	Antibiotic	1	5

Answer questions (a) to (c) based on the information provided on the medication form above.

(a) The following shows the relation of the Admission table based on the medication form above:

`Admission (PatientID, WardID, DrugID, PatientName, WardName, DrugName, DrugType, Dosage, UnitsPerDay)`

Draw the dependency diagram in 1NF, showing the partial and transitive dependencies. Underline the primary key(s).

[4 marks]

(b) Based on your solution in Question 3(a), normalize the dependency diagram to 2NF. Show the resulting dependency diagram. Underline the primary key(s).

[3 marks]

(c) Based on your solution in Question 3(b), normalize the dependency diagram to 3NF. Show the resulting dependency diagram. Underline the primary key(s).

[3 marks]

Continued...

QUESTION 4

(a) The following table shows the tasks and computations of two transactions T1 and T2:

Transaction	Computation
T1: Purchase 50 units	Qty_onHand = Qty_onHand + 50 (Rolled back)
T2: Sell 20 units	Qty_onHand = Qty_onHand - 20

i. Briefly describe the uncommitted data problem in database transactions.

[1 mark]

ii. Assume that the quantity on hand (Qty_onHand) is 50. Using the information provided in the table above, show how uncommitted data problem occurs for concurrent transactions T1 and T2. You need to draw a table showing the sequence of the transactions and how uncommitted data occurs.

[4 marks]

iii. List TWO concurrency control methods that can be applied to address the uncommitted data problem.

[1 mark]

(b) The following table shows a partial data of a PROJECT table:

ProjectID	Name	Location	Payment Deadline	Budget
P1	DatabaseFrag	Penang	10-10-2014	180000
P2	Maintenance	Cyber	31-07-2015	54000
P3	Maintenance	Cyber	21-02-2015	32000
P4	DatabaseFrag	KL	05-12-2014	695000

Partition the PROJECT table using the *vertical fragmentation* strategy. Show the resulting tables contents.

[4 marks]

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